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The Aeronautical Journal.

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19, Campden House Road, Kensington, London, W.

NOTICES OF The Aeronautical Society.

A special meeting of the Council was held at the Society of Arts on Thursday, January 31st, 1901.

RESOLVED—

That the following address of condolence on the occasion of the lamented death of Her Late Majesty Queen Victoria should be presented to His Majesty the King:—

"To His Majesty King Edward VII. of "the United Kingdom of Great Britain and "Ireland, Emperor of India.

"We the undersigned members of the "Council of the Aeronautical Society of "Great Britain on behalf of the Council "and Members of the Aeronautical Society "of Great Britain, wish to humbly offer our "condolences to your Majesty on the great "sorrow you have sustained in the death of "our beloved Sovereign, the late Queen, "and to present our congratulations to your "Majesty on your accession to the Throne "and to respectfully assure you of our un-"swerving loyalty and devotion to your "Majesty's person."

Signed, EDWARD P. FROST, *Chairman.*
EDWARD A. BARRY.
WILLIAM CROOKES.
LESLIE M. EARLE.
JOHN DAVIDSON FULLERTON.
HIRAM S. MAXIM.
H. C. ROBERTS.
ERIC STUART BRUCE,
Honorary Secretary.

The following reply of His Majesty has been received through the Home Secretary by the Honorary Secretary:—

HOME OFFICE,
WHITEHALL,
15 *February*, 1901.

SIR,—I am commanded by the King to convey to you hereby His Majesty's thanks for the loyal and dutiful address of the Council of the Aeronautical Society of Great Britain, expressing their sympathy with His Majesty and the Royal Family on the occasion of the lamented death of Her Late Majesty Queen Victoria.

I am, Sir,
Your obedient Servant,
(Signed) CHAS. T. RITCHIE.

The following gentlemen have been elected Members of the Society:—

PROFESSOR GEORGE HARTLEY BRYAN, SC.D., F.R.S.

MR. SAMUEL HERBERT RIDER SALMON.

The following gentlemen have been elected Honorary Members of the Society:—

Monsieur Wilfred de Fonvielle, Ex-President of La Société Française de Navigation Aérienne, on account of his distinguished services to Aeronautical Science.

Monsieur Jacques Faure, the Treasurer of the Paris Aéro-Club, on account of his eminent work in Practical Ballooning.

GENERAL MEETING.

The next General Meeting of the Aeronautical Society will be held in the Rooms of the Society of Arts, John Street, Adelphi, on Monday, April 15th, at 8 p.m. Major H. C. Roberts will take the chair.

For this occasion Monsieur Wilfred de Fonvielle, Ex-Annual President of La Société Française de Navigation Aérienne, will come especially from Paris to London to address the Members of the Aeronautical Society of Great Britain (in English) on "Aeronautics in France," when he will describe the progress made since he escaped in a balloon during the siege of Paris, in November, 1870, and discuss the actual prospects of Aerial Navigation.

The discourse will be illustrated by lantern slides.

Mr. Charles Groombridge (Member of the Aeronautical Society) will exhibit and explain his new Propeller for Aeronautical purposes.

There will be a demonstration of the "Meteoparachute," a new instrument for investigating the upper atmosphere, by Mr. Eric Stuart Bruce, M.A. Oxon., F.R.Met.Soc.

During the evening a series of lantern slides in illustration of the trial trips of the Zeppelin Airship and M. Santos Dumont's Navigable Balloon will be projected on the screen.

A working model of a Navigable Balloon will also be exhibited in action.

Members are reminded that they have the privilege of introducing two friends to the General Meetings of the Society.

Members and Correspondents of the Aeronautical Society are reminded that the present address of the Aeronautical Society is 19, Campden House Road, Kensington, London, W., and that all communications should be addressed to the Honorary Secretary to that address.

ANNUAL SUBSCRIPTIONS.

The annual subscriptions to the Aeronautical Society are now due. Those Members who have not yet paid their annual subscriptions are requested to forward them to the Honorary Secretary, 19, Campden House Road, Kensington, London, W. The attention of those Members is called to Rule IVa, which states that the privileges of Members extend only to those who have paid their subscriptions for the current year.

ERIC STUART BRUCE,
Honorary Secretary.

In Memoriam.

SINCE the last issue of this journal all its readers have been united in one common tie—the tie of sorrow for the loss of our beloved and honoured Queen, and the sounds of public and private joy have been hushed awhile in the tremendous gloom which so suddenly enshrouded our nation. Few of us had not felt the shadow of death in its intensity, but we then saw it in its immensity. From its presence there could be no escape. It overhung the length and breadth of the land; nor indeed were its limits defined by those boundaries which men mark out under the name of nationalities, for those whose duty called them from these shores on the days of sorrow when they landed on some foreign soil emerged not from the canopy of gloom. E'en where the revered lady held no regal sway she had become monarch of men's hearts.

Of the Victorian Era and the great personage whose influence went far to make it one of the most extraordinary epochs in the world's history, many pages have been already written. It is meet that a scientific journal should select some point of view which has a marked bearing on the progress of science generally, and of the particular science of which it is the organ.

That the Victorian Age has been one of extraordinary scientific development is apparent to everyone in the rapid strides which the applications of science have taken, even in the memories of those who may still be called young, while those who can remember the accession of the late Queen in 1837 will indeed bear witness to the contrasts in the mode of life between that year and the opening of the new century. When we proudly celebrated the Jubilee of Queen Victoria in 1887 we were struck by the fact that the Jubilees of nearly all the foremost applications of science were coincident with Her Jubilee. In 1889 we kept the Jubilee of the Electric Telegraph. In the following year we commemorated the Jubilee of the first passage of an Atlantic steamer from the Old World to the New. 1889 brought into Jubilee celebrations that of Photography, which was first developed in 1839; that of the Screw Propeller, and that of Nasmyth's Steam Hammer. We had indeed a galaxy of invention to grace the commencement of a brilliant reign, and a host of prospering scientific Jubilees to enhance the beneficent fame of the year 1887. It is natural to look for causes to account for the prospering developments of these various inventions, all of which may be said to share in the civilizing tendency of abridging distance and shortening time. Many causes must have united to bring about so prosperous an issue, but one cause stands out prominently in relief. This cause, indirectly, we owe to our Queen. It was the genius, energy, and individuality of the late Prince Consort which first made practical science international. He planned and carried out the great International Exhibition of 1851, which first gave our nation the opportunity of comparing the wealth of the world and made her own industry known and sought after in every clime.

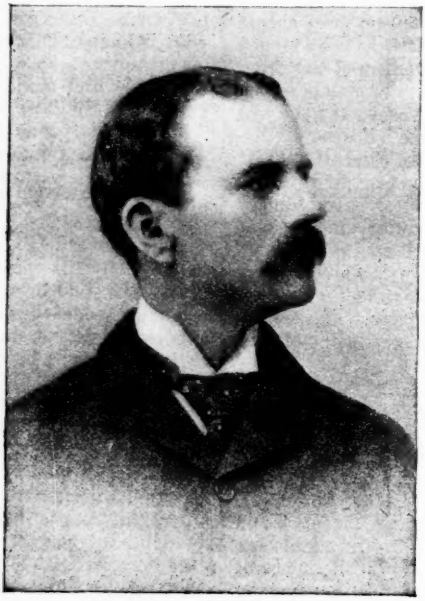
It may be thought by some that Aeronautics has not equally shared in the progress of the Victorian Era, since the great problem of air navigation has yet to be solved.

But this indeed is a fallacy. The balloon, by its power of overcoming gravity, has added vastly to our means of acquiring knowledge of the upper atmosphere, and most of the great truths learnt by its means will be found to grace the Victorian Era. The bond of Cosmopolitanism has ever been peculiarly strong betwixt the aeronauts of every nation, and it is largely through international work and co-operation that aeronautics is rapidly assuming so dignified and important a position. Many are the branches of usefulness opening out for its enterprise. It is on the advance of this science that the future advances of meteorology must depend, and the two sciences are destined to act and re-act on one another for their mutual advantage. The war in South Africa has shown the value of the balloon in warfare, and our national balloon equipments alone tell of modern progress in balloon manufacture and balloon accessories. There is, too, a consoling thought concerning the experiences of the balloon in the South African struggles. Its presence in the campaign most certainly hastened victory, and averted one terrible disaster, so that the balloon actually lessened by at least one the sorrows and griefs which our Queen endured, on account of this campaign, during the last year of her life.

Some Celebrities of the Paris Congress.

No. 6.—MR. ABBOTT LAWRENCE ROTCH.

From time to time we have had occasion to mention in this journal the kite work of Mr. Rotch at the Blue Hill Observatory, and it is, therefore, with great pleasure, that we are able to present to our readers a portrait of this eminent meteorologist, and a sketch of his career. It will be seen that Mr. Rotch not only founded the Blue Hill Observatory, but he directs its work, and with unstinted generosity, maintains it. Considering the extreme importance to meteorology of his great heights in the free air by means of kites, Mr. Rotch may be considered one of the greatest benefactors to meteorological science.



MR. ABBOTT LAWRENCE ROTCH.

Mr. Abbott Lawrence Rotch was born in Boston, U.S.A., in 1861, and studied mechanical engineering at the Massachusetts Institute of Technology. Being interested in meteorology and possessed of an independent fortune, he established, in 1885, a meteorological observatory on the summit of Blue Hill, the highest land in the vicinity of Boston. This observatory has since been supported and directed by him; there are three assistants, and the annual cost of maintenance exceeds method of taking systematic observations at £800. The investigations and observations are published in the *Annals of the Astronomical Observatory of Harvard College*. These relate especially to cloud measurements and the results obtained with kites. Mr. Rotch has travelled extensively in Europe and America. In 1885 and in 1887 he studied the mountain observatories and the meteorological services of Europe, and published an account of them in the *American Meteorological Journal*, of which he was associate editor. He observed the total solar eclipses of 1887, 1889, 1893 and 1900, in order to make certain meteorological observations. At the Paris Exposition of 1889, Mr. Rotch was the American member of the International Jury of Awards for scientific instruments, and received himself the Cross of the Legion of Honour. In 1891 he attended the International Meteorological Conference at Munich, and was there appointed a member of the International Committee on Clouds, which

has done an important work in issuing an atlas of cloud forms and in instituting measurements of their height and velocity all over the world. Mr. Rotch, having made several balloon ascents, was interested in scientific aeronautics, and, accordingly, in 1894, furnished the opportunity to Mr. W. A. Eddy to raise a self-recording instrument with his kites from the Blue Hill Observatory. The practicability, thus demonstrated, of obtaining simultaneous observations on the ground, and in the free air with kites, led to the prosecution of the exploration of the air at various heights and under different weather conditions, with increasing energy, so that, at the present time, it is the chief work of this observatory. In 1896 Mr. Rotch presented his method of investigation to the International Meteorological Conference at Paris. He was chosen a member of the International Aeronautical Committee, which met again at Strassburg in 1898, and has conducted the systematic exploration of the atmosphere with balloons and kites on the continent of Europe. As the work at Blue Hill became known, it was repeated elsewhere, notably by the United States Weather Bureau which, in 1898, attempted to obtain from 16 stations situated in the central States, daily observations at the height of a mile for forecasting. Unfortunately, this scheme was frustrated in many instances by light winds. At Trappes, near Paris, M. Teisserenc de Bort, using Mr. Rotch's kites, began a systematic study of the upper air in connection with "ballons-sondes" for greater heights. Last year the Prussian Meteorological Institute established, near Berlin, a special Aeronautical Observatory for the prosecution of similar researches, and investigations with kites are also being carried on at Hamburg and at St. Petersburg. The extreme heights reached with kites, both at Trappes and at Blue Hill, exceed three miles, and the meteorological results are proving of the greatest importance for the progress of the science.

Mr. Rotch is a corresponding member of the British Association for the Advancement of Science, the German Meteorological Society, and the German Society for the Promotion of Aeronautics. He is also an honorary member of the French Alpine Club.

Members of the Aeronautical Society of Great Britain will be interested to hear that Mr. Rotch is preparing, for a future meeting of that Society, a paper on the principal scientific discoveries that have been made by means of kites.

Experiments with the Zeppelin Airship.

In the October number of this journal some account was given of the first ascent of the Zeppelin Airship on July 2nd. Great efforts were made to renew the experiments in the autumn months, during which calm weather so frequently prevails, for, undoubtedly, this is at present, an essential condition for any airship that is navigated by mechanical means. At first it appeared as if these efforts would be frustrated, as an accident happened to the great balloon in its shed on the night of September 24th, which retarded the experiments for several days. In the middle of the night the aluminium frame which was suspended to the roof of the floating house suddenly fell down, and the central portion of it was bent and damaged in several places. The damage, however, was repaired by October 17th, and after waiting for a storm to subside, the balloon was filled for an ascent on October 24th. The inflation of the 17 balloons with pure hydrogen was accomplished with great dexterity and speed, and the signal for the ascent was given at 4.45 p.m. It appears that almost absolute air stagnation prevailed at the time of the ascent, which took place in rainfall and under a completely overcast sky. There seemed every chance that the great airship would distinguish itself by making a long journey. The stillness of the air was not only confined to the atmosphere bordering upon the surface of the earth, but the same condition was apparent at some little altitude. A small military unmanned captive kite-balloon took an absolutely vertical position. The balloon carried an anemometer whose indications were registered on the ground by means of a connecting cable. A pilot balloon that was sent up also testified to the quietness of the atmosphere, as, after it had ascended to several hundred metres, it fell only twenty metres distant from the place where it had been sent up. The passengers in the airship on this occasion were Count Zeppelin, M. Burr, M. de Krogh, M. Wolf, and M. Gross. The ascensional force was 70 kilos., and the ballast carried was 1,200 kilos. The aerostat was in equilibrium at the height of 300 metres above the lake.

Captain H. W. L. Moedebeck has pointed out in an article in "Illustrirte Aeronautische Mitheilungen" (October 1900), that no accurate estimate of the speed of airships can be obtained by short journeys; and this might have been an opportunity of deter-

mining accurately the absolute and relative speed, by taking a fairly long excursion in the direction of the aerial current; but an accident was unfortunately forthcoming to hinder the execution of any such useful programme. One of the rudders at the back of the vessel which had been placed too near the exterior of the envelope of the balloon caught in it and remained fixed on the larboard, so that the balloon turned to larboard. It was a little while before the aeronauts found out the cause of this movement, and there was consequently a delay in getting the others to act in opposition. As the balloon had descended to a low position and it was getting late, it was decided to turn the balloon to the left and go backwards, so as to alight on the floating bridge. But the first time this manœuvre was attempted the ship was turned too suddenly and it got out of a favourable position for the descent. A second attempt was more successful, and the balloon was just in the right position to descend on the bridge by taking an inclined curve, when another accident happened which forced a more rapid descent on to the lake. This was the collapse of one of the seventeen balloons, the gas suddenly escaping owing to the valve having automatically opened. This loss of gas so diminished the buoyancy of the ballcon that it was impossible to maintain it any longer in the air. The aluminium cars floated on the surface of the lake, and the airship was towed to its resting place. The length of this ascent was one hour and twenty minutes; but it cannot be called a journey.

Another trial took place on October 21st at 4.55 p m., and in another calm atmosphere. This time the balloon was only in the air twenty minutes, but the ascent was, perhaps, the most successful of the series. The balloon made an actual return journey, travelling part of the time against the feeble current, and the descent was manœuvred quite close to the shed. For this ascent two of the rudders were dispensed with, one in front and one behind being retained. By this arrangement it appears that the balloon was very manageable, and answered perfectly the movements of the rudders. There was, however, a disadvantageous circumstance during this ascent, which was, the want of pure hydrogen obtained by electrolysis, to fill the balloon which had been accidently emptied during the previous ascent. The gas used was too heavy, and it was the want of lifting power that curtailed this last ascent.

The speed of the balloon is estimated at 3 m. 5, per second when going against a wind of 3 metres per second; but as has been above stated, it is not fair to judge of exact speeds from ascents in which only short journeys are made. It is to be hoped that longer journeys will be made during the coming summer if the winds and storms of the winter which have played such havoc with the airship have not put fresh experiment out of the range of practicability. It seems, indeed, strange and improvident that after a fortune had been spent in building this unique machine it should be left to the mercy of the tempest when means of protection might have been afforded at trifling cost.

If further experiments are made with the great balloon next summer, and if anything like a long journey is attempted it is hoped that exact measurements of the wind force will be taken from the cars of the ship itself, and not only by occasional test balloons and from the platform of the balloon shed. The wind force on the platform of the boat-house might not represent at all the forces at 300 feet elevation. Experiments at the summit of the Eiffel Tower have proved that the average velocity of wind at even that moderate elevation during the summer months to be much greater than has been supposed. It is found that the average of 100 days of observation from the summit of the Eiffel Tower is rather more than 7 metres per second, the average on the ground being rather more than 2 metres per second. It would seem, therefore, that for most days of the year the wind velocity taken at the platform of the balloon shed would be useless for the question at issue, viz., the wind force actually encountered by the balloon. However, the days on which the experiments with the Zeppelin Airship were made appear to have been exceptionally still, and, possibly, the platform records fairly represented the wind force at the higher levels in which the balloon travelled. Therefore, the wind forces taken on the roof of the balloon shed every three minutes during the first flight of the balloon on July 2nd, are here appended:—

Time.	Wind force in metres per second.
8. 0 p.m.	5.5
8. 3 „	5.3
8. 6 „	2.6
8. 9 „	4.4
8.12 „	2.7
8.15 „	4.3
8.18 „	3.8
8.21 „	3.7

One of the main points on which Count Zeppelin is to be congratulated is that three

times he has raised petroleum motors of considerable power in a balloon without a conflagration. This is, in itself, a remarkable feat. But could he have done this had there been any wind worthy of the name on the days of experiments?

There can be no doubt that Count Zeppelin, by the construction of the airship, has stimulated aeronautical enterprise in all parts of the world; and everyone will admit that he has well earned the honour of the Order of the Red Eagle which the German Emperor has bestowed on him.

The Kress Dragon Flyer.

There can be no doubt that the development of the autocar has done very much to stimulate fresh efforts to solve the problem of air navigation by means of a body heavier than air, for it first concentrated attention on those light and powerful benzine motors which the air student is pressing into the service of aeronautics. One of the latest efforts attracting public attention in Germany is the Kress Dragon Flyer—a flying machine constructed on the aeroplane principle. But though Herr Kress has been stimulated to new efforts by the possibilities of modern light motors, he has been working at his invention since 1878. Lately he has received substantial encouragement by the German Emperor's gift of £208, which may not only be in itself an aid to the construction of the light motors he considers necessary to success, but may also be an attraction to the generosity of others.

The Kress Aeroplane may be described as an iceboat having two keels and a long stem. These keels act as runners when the machine is travelling over ice or snow. The boat will also glide on the surface of water. Two resilient sail propellers rotated by a benzine motor in opposite directions provide the motive power. There is not a single aeroplane in this machine, but three arched sails or kites are carried, one sail or kite being mounted somewhat above the other so that it will receive an impinging body of air without interference from the other sails. There is an horizontal and vertical rudder for guiding the aeroplane. Want of funds has hitherto prevented the inventor from making a light motor of the design planned, and, therefore, he has not yet attempted to rise in the air, but has been contented with excursions on the water, which he first made in 1900, having borrowed a two-cylinder motor for these aquatic trials. Herr Kress considers that experiments on the water are necessary preliminaries to the more daring departure of aerial flight. A recent article in the *Scientific American* points out that these excursions give the inventor the opportunity of ascertaining whether all the parts of the machine work properly, enabling him to practise, gradually increase the speeds, and imparting a sense of security which may at last give him sufficient confidence to rise in the air. Herr Kress thinks that the moment of rising may come unawares. The ship may, of its own accord, leave the water. According to calculations made by Lilienthal, it is considered that to leave the land, the speed necessary for the machine to lift itself should be at least 9 metres per second; when travelling in water, Herr Kress calculates it would have to be 10 metres per second; but when once lifted into the air, the speed would be changed to 16 metres per second.

REVIEWS.

VERTICAL GRADIENTS OF TEMPERATURE, HUMIDITY, AND WIND DIRECTION: A Preliminary Report on the Kite Observations of 1898. By Dr. H. C. Frankenfield.

We have recently received from the United States Department of Agriculture Weather Bureau, Dr. H. C. Frankenfield's preliminary report on the United States Weather Bureau Kite Observations of 1898, which is a most valuable contribution to meteorological knowledge, and goes far to prove the usefulness of the kite as a means of taking systematic observations of various conditions of atmosphere, though there is a limit to the usefulness of the kite owing to the break in the observations which must occur on account of the number of days in the year when there is not sufficient wind to fly the kite. This disadvantage would appear to point out the desirability of calling in the use of captive balloons for those days when there is not sufficient wind to raise the kite. By the use of both these agents for raising self-recording instruments, the wind force determining which should be used, there need not be interruption in the observations. But even though weather conditions broke the continuity of these ascents, the *Meteorological Journal* of July, 1900, considers that Dr. H. C. Frankenfield's paper "discusses probably the largest amount of free air meteorological observations ever taken within a like space of time over so large an area, and adds to the general knowledge of temperature and

hygrometric condition of the lower levels of the air."

The kite ascents were commenced at seventeen stations during the latter portion of the month of April, and were continued into the early days of November, 1898; but in the report only the results of ascents from May to October have been tabulated. The seventeen stations were as follows:—Washington, D.C.; Cairo, Ill.; Cincinnati, Ohio; Fort Smith, Ark.; Knoxville, Tenn.; Memphis, Tenn.; Springfield, Ill.; Cleveland, Ohio; Duluth, Minn.; Lansing, Mich.; Sault Ste. Marie, Mich.; Dodge City, Kans.; Dubuque, Iowa; North Platte, Nebr.; Omaha, Nebr.; Pierre, S. Dak.; Topeka, Kans.

The highest of these stations was North Platte, Nebr., which was 28,111 feet. The lowest was Washington, D.C., which was only 115.

There were made 44 per cent. of the total number of ascensions which would have been possible had the wind and weather conditions been favourable. The percentage of ascents at the different stations varied from 75 at Dodge City, Kans., where the wind velocity was greatest, to 12 at Knoxville, Tenn., where it was least. The largest number of ascents was obtained in the country west of the Mississippi River, and the least in the central river valleys.

The temperature conditions at all elevations and under varying conditions of weather and time have been computed in terms of the gradient in degrees Fahrenheit for each 1,000 feet, and in the increase of elevation necessary to cause a fall of 1 degree in the temperature. The mean results, however, are given only in degrees per 1,000 feet.

Attention has also been given to the questions of wind directions, relative humidity, and vapour pressure.

The following concise summary of the observation is given in the introductory chapter.

I. TEMPERATURE.

"The mean rate of diminution of temperature with increase of altitude, as determined from 1,217 ascensions and 3,838 observations, taken at elevations of 1,000 feet or more, was 5.0° for each 1,000 feet, or 0.4° less than the true adiabatic rate. The largest gradient 7.4° per 1,000 feet, was found up to 1,000 feet, and, thereafter, there was a steady decrease up to 5,000 feet, the rate of decrease becoming less as the altitude increased. The gradient up to 5,000 feet was 3.8° per 1,000 feet. Above this altitude there is a tendency toward a slow rise, but the lack of a sufficient number of observations above 6,000 feet forbids a definite statement to that effect. The morning gradients were also greatest up to 1,000 feet, and least up to 5,000 feet, and the rate of decrease was about the same as the mean rate, the curves showing a very close agreement in this respect. The average morning gradient was 4.8° per 1,000 feet. The afternoon gradients were larger, but not decidedly so, the average value being 5.8° per 1,000 feet. The greatest rate of decrease is still found at 1,000 feet, and the least up to 5,000 feet if the few observations at 7,000 feet are not considered as of equal weight. When the stations of observations were grouped according to their geographical locations, it was found that the mean rate of temperature decrease with increase of altitude was much greater in the central Mississippi than in the upper Lake region, the central west, or the extreme east, as represented by the single station at Washington. It was 5.8° per 1,000 feet as compared with 4.7° for the central west, 4.6° for the upper Lake region, and 3.6° for the Atlantic coast. There is also a very close agreement between the means for the upper Lake region, those for the central west and the grand mean, and a marked deficiency on the Atlantic coast, where the gradient was 1.4° per 1,000 feet less than the mean rate. These general statements apply also to the morning results. In the afternoon, however, the differences were quite small, the extreme difference being 0.6° per 1,000 feet. The maximum gradient 6.1° was found in the central Mississippi Basin, and the maximum 5.4° in the upper Lake region.

II. RELATIVE HUMIDITY.

"The relative humidities at and above the surface of the earth differed but little except at 7,000 feet, where the surface humidity was 11 per cent. less than that above. With this exception the greatest difference was 3 per cent., and except at 2,000 and 8,000 feet, the upper air percentages were the lower. The mean result obtained from all these observations showed 60 per cent. at the surface and 58 per cent. above, a difference of 2 per cent. The stations at which there were marked differences were Washington, where the mean difference was 14 per cent.; Omaha, where it was 29 per cent.; Springfield, Ill., where it was 21 per cent., and Fort Smith, where it was 12 per cent., the surface humidity being the higher except at Fort Smith. At the remaining thirteen stations, except Lansing, the upper air humidity equalled or exceeded that

at the surface, but the difference at no place exceeded 10 per cent. At nine stations the difference was 5 per cent. or less."

III. VAPOUR PRESSURE.

The vapour pressures are expressed in percentages obtained by the formula $\frac{P}{P^0}$ in which P represents the vapour pressure at any given altitude, and P^0 that observed simultaneously at the earth's surface. The mean of the percentages thus obtained was 59, and there was a steady, though not by any means uniform, decrease with increase of altitude. The percentage at 1,500 feet was 82, and at 8,000 feet 44. The decrease was most rapid between 2,000 and 5,000 feet, where it averaged 9 per cent. for each 1,000 feet. The decrease between 5,000 and 6,000 feet was only 3 per cent., while between 6,000 and 7,000 feet it was 10 per cent. The lowest percentage, 52, was found at Omaha, and the highest, 77, at Pierre.

SOUNDING THE OCEAN OF AIR: Six Lectures delivered before the Lowell Institute of Boston in December, 1898, by A. Lawrence Rotch, S.B., A.M., Director of the Blue Hill Meteorological Observatory. Society for Promoting Christian Knowledge.

This admirable little volume affords an abundance of information on a subject concerning which the public has hitherto had little opportunity of gleaning any adequate idea. But while it partakes of the popularity of style which is a distinguishing feature of the Romance of Science Series, there is much in its pages that will be welcome to the scientific reader, and no scientific library should deny a place for the book on its shelves.

In the introductory chapter there is some well-compiled general information on the nature and extent of the atmosphere, the exploration of which is the subject of the book under review. The reader may well direct his attention to Plate I., a glance at which will probably give him a clearer conception of comparative altitudes in the atmosphere than he has ever had before. The diagram represents a vertical section of the lower portion of our atmosphere. On the right is a scale of miles above the sea, and on the left is a scale of barometric pressures corresponding to the height. On the right-hand half of the diagram we are shown the eastern hemisphere, with the Himalaya Mountains, on the left-hand half the western hemisphere, with the Andes. There are also depicted the height of the different kind of clouds which are measured at Blue Hill, and which form the subject matter for a whole subsequent chapter. Then we can see the highest mountain meteorological stations in the world, those on Mont Blanc, and El Misti in Peru, the highest inhabited place—a monastery in Thibet, and the greatest height to which a mountaineer has climbed—on the Andes. About half a mile higher than the Himalaya Mountains is placed a balloon to represent the height reached by Messrs. Glaisher and Berson in a balloon in 1862 and 1894 respectively, as has been before mentioned in this journal. A discussion has lately arisen as to which of these aeronauts reached the highest point; and it would seem as if the point is destined to remain for ever undecided. It is true that Mr. Berson produced an observed record of 30,000 feet, whereas Mr. Glaisher's last observed record before he fainted was 29,000 feet. Some weight should, however, be given to the opinion of Glaisher, that after the last observation was made the balloon reached 37,000 feet before descending. After this object in the diagram, comes a great gap, the monotony of which nothing breaks, until we come to the average of the three highest ascents of a ballon-sonde in 1894, which is fourteen miles, more than double the height of the ascents of Messrs. Glaisher and Berson. This shows at once the value of the ballon-sonde as a means of penetrating the atmosphere. A contrast to the height of the ballon-sonde is afforded by the position of the kite flight from Blue Hill in 1898. Though kites cannot be reasonably expected to attain to such heights as the ballon-sonde, still the position indicated in the diagram does not represent the latest achievement in kite-flying at Blue Hill; the record in 1898 being about a mile and a half, while last summer, on July 19th, the record was 15,900 feet.

For observations at the lower levels of the air, it would be difficult to over-estimate the value of the kite, as will be fully realised by the readers of chapter VI. in Mr. Rotch's book. The least conspicuous object in this comparative diagram is the Eiffel Tower—a thousand foot measure. So insignificant does it appear compared with the other altitudes represented, that it almost escapes notice. But on one point, observations on the Eiffel Tower claim superiority over those taken on lofty mountains, for they are secured under fairly isolated conditions, and are not handicapped by the disturbing conditions attending mountain observations.

Chapter II. deals with the Blue Hill observations on Clouds; and treats of their formation, classification, and measurement. The observation of clouds is one of the most systematic means that we at present possess of observing the movements of air currents, an observation full of interest to the aeronaut, for the horizontal currents are, at present, his motive power. Every light, therefore, that can be thrown upon aerial currents by the observation of cloud movements is of extreme value to aerial navigation. The contents of chapter II. show that the method of observing clouds at Blue Hill has been eminently successful. For twelve years the amount of cloud at each hour of the day has been recorded at Blue Hill. The maintenance of personal observations at each hour of the night is arduous; and, therefore, an automatic instrument has been used at Blue Hill, which, in Mr. Rotch's opinion, deserves to be better known. This is called the "Pole Star Recorder," and a complete description of the instrument will be found on page 48.

A diagram which the reader may study with advantage, is Plate IV., page 57, giving the heights and velocities of clouds measured from Blue Hill. An interesting passage in the text is that treating of the motion of the clouds at higher levels. "The average velocity of cirriform clouds is ninety miles an hour in winter and sixty miles in summer, but occasionally in winter cirrus have been found to have the enormous velocity of two hundred and thirty miles an hour. In the average, the velocity of the currents increases, from the lowest to the highest clouds at the rate of about three miles an hour for each 1,000 feet of height, but near the ground the increase of height is faster. It has been found that the velocity of the lower clouds is less than the velocity of the wind on a mountain of the same height, which may, perhaps, be explained on the supposition that the mountain acts like a dam to accelerate the flow of air over it. The measurements in Sweden showed that the middle and upper levels of clouds are higher than in America, but that they move less rapidly. This may be because the surfaces of equal temperature in the air are higher in the United States than in Sweden, on account of the direction of the upper currents, while the greater velocity of our high clouds correspond with the more rapid movement of areas of low and high barometric pressure over the United States.

The results are suggestive. For instance, the energy of the upper half of the mass of the atmosphere, or that portion which lies above 18,000 feet, has been calculated to possess six times the energy of the lower half in which we live, and, as yet, none of this enormous store of energy is applied to the use of man. While it appears certain that no navigable balloon or flying machine will ever be able to stem the enormous velocity of the upper atmosphere, rarified though it is, perhaps in the future, aerial machines will take advantage of the prevailing currents of the high atmosphere as our sailing ships do of the trade winds."

Chapter IV. is devoted to the subject of the "Ballons-Sondes" or self-recording balloons, and gives us a concise history of their use and description of the self-recording instruments they carry. It was in April, 1895, that the ballon-sonde cirrus rose to the extraordinary height of 72,000 feet, more than 13¼ miles, where the barometric pressure was reduced to one and a half inches of mercury. The comparative warmth recorded (—50° Fahrenheit) has led Dr. Arsman himself to doubt the accuracy of the usual methods of registering temperature at such extremely low pressures. This is a very important point to determine, as if the results of these high ascents are erroneous, the value of the ballon-sondes would be much diminished. The question, therefore, of accuracy, should be thoroughly investigated, and if the present forms of apparatus do not secure it, it is hardly too much to expect that modern ingenuity cannot remedy the defect.

One of the greatest triumphs connected with the ballons-sondes was M. Cailletet's ingenious apparatus to bring down samples of air from the high regions. This will be found fully described on page 112. Another contribution of M. Cailletet, described in the same chapter, is an apparatus for measuring the height of the balloon by photography, in order to verify Laplace's formula connecting the barometric pressure with the altitude. Another instrument designed for the ballons-sondes, and fully described, is M. Violle's actinometer to determine the solar constant.

Chapter V. deals with the history and application of kites to meteorological purposes at Blue Hill and elsewhere, and is undoubtedly the best summary of the subject that has hitherto been published if we make one exception, by the omission of the name of Major Baden-Powell, in connection with the development of the kite. It is true that Major Baden-Powell's work has rather tended to show the usefulness of the kite in war than as a meteorological instrument, but he has produced a very efficient kite of his own de-

sign, and has done much to attract public attention in this country to the kite method of raising bodies into the air.

Chapter VI. treats entirely of the scientific results of kite ascents. These are already numerous and important. As has been mentioned in another part of this journal, Mr. Rotch is preparing a special paper for a meeting of the Aeronautical Society of Great Britain, on the actual discoveries made by means of kites. This will contain the latest information on the subject. In the meanwhile members of the Society and others interested in scientific kite flying will do well to peruse the last chapter of the work under review.

An interesting subject which kite flying may in the future elucidate, is the origin of cyclones and anti-cyclones. Data is given in the chapter mentioned, which has called for the following remarks of Mr. Rotch, with which we will conclude this review.

"The study of these data indicate that the cyclonic and anti-cyclonic circulations observed in this latitude do not embrace any air-movements at greater altitudes than 2,000 metres, except in front of the cyclone, when the air appears to be carried upward to a great height. Above 2,000 metres there are probably other weak cyclones and anti-cyclones or secondary ones, with their centres at different places from those at the earth's surface, and producing a different circulation of wind. The observations of the cirrus clouds at Blue Hill indicate that at their level exists a cyclonic circulation above the anti-cyclone apparent at the earth's surface. The shallowness of our anti-cyclones would be inferred from the great differences in speed of the general atmospheric drift, for since the velocity of the general drift from the west is more than thirty times greater at 10,000 metres than it is at 200 metres, a circulation of great depth could not endure long. Cyclones and anti-cyclones appear to be but secondary phenomena in the great waves of warm and cold air which sweep across the United States from periodic causes.

The origin of cyclones and anti-cyclones is, perhaps, the most important problem remaining for meteorological study. The theory that they are produced by differences of temperature in adjacent masses of air, or as it is called, the convictional theory of the American meteorologists, Espy and Ferrel, is opposed by the observations on mountains in Europe which were collected by Dr. Hann, of Vienna. If the question can be solved by the use of kites, as seems to be foreshadowed by the results just stated, another foundation stone will be laid in the science of meteorology, and the status of the kite, established as an instrument of research."

By Land and Sky. By the Rev. John M. Bacon, M.A., F.R.A.S. (Isbister and Company, London.)

The literature of travels in the air is, at present, not over abundant. So much the more welcome is every new addition to the records of those who have braved the perils of ballooning in hopes of enriching our practical experience of aeronautics and our general knowledge concerning the atmospheric envelope of our planet. "By Land and Sky," by the Rev. John M. Bacon, is a graphic and picturesque description of travels in the air, and will be read with interest and pleasure. Indeed, from its peculiarly vivid accounts of the sights that can be seen, and the sounds that can be heard from the car of a balloon, it should win many a recruit to the noble cause of ballooning.

The present volume cannot, however, be called a scientific treatise on discoveries in the atmosphere. Possibly, Mr. Bacon has not yet given to the world the whole contents of his note book, and is reserving some special results for a second and less popularly written volume. Anyhow, in the book under review, there is an absence of the strict methods of research which alone have the power of wresting secrets from Nature. Consequently, we search in vain for any definite scientific conclusions, even in the acoustical experiments. In making this mentioned criticism it is by no means wished to disparage the praiseworthy efforts of Mr. Bacon or to undervalue his dauntless courage, which quality renders him so peculiarly fit for the work he is undertaking. It is rather suggested that in future expeditions, the results might be increased in their value if he were to concentrate his energies upon some more definite plan of research. In the present volume there are several circumstances mentioned which are suggestive of subjects of research for future ascents. For instance, the author's energies might attack the imperfectly understood motions of horizontal aerial currents at different altitudes in different directions, which are full of promise as a natural means of aerial locomotion. Where can these be studied as well as from the car of a balloon? Again, in many places, Mr. Bacon mentions the presence of the vertical currents of the atmosphere and their effect upon the stability of the balloon

in the air. Still less is known about the motions of the vertical currents than those of the horizontal ones; but they have an important bearing on both meteorology and aeronautics, and a determination of their causes and an exact measurement of their forces would be of extreme value.

But if the work lacks definite scientific conclusions, it abounds in incidents, adventures, and narrow escapes. The greatest instance of the latter is afforded in the chapter entitled "In Quest of the Leonids," when Mr. Bacon and his daughter ascended in a valveless balloon, and so dramatic were the incidents of the voyage under these peculiarly dangerous conditions, that the reader must indeed be of a calm frame of mind who does not become breathless when he reads this tale.

Mr. Bacon is an expert photographer from a balloon, and amongst other photographs has added, as an attraction to his volume, that very excellent and clear photograph he secured at a height of 1,000 feet above Clifton. Another photograph taken by Miss G. Bacon records one of the perils of the voyages. "Descent across a telegraph wire." This lady must be congratulated on her skill as a photographer, but still more so on the absolute bravery she has displayed in being the companion of her father on his fascinating aerial voyages.

Meetings of the Permanent International Aeronautical Congress.

January 17.

At a meeting of the Permanent International Aeronautical Congress at the Institute on January the 17th, several new subcommittees were nominated, and their work will be the furthering of the following resolutions of the Congress of 1900:—

To interest governments in the publication of aeronautical documents and records, in the formation of balloon parks or private aeronautical laboratories, and in the methodical training of civil aeronauts.

The publication of an Aeronautical Formulary or Guide Book.

The drawing up of a technical instruction on kites.

The consideration of the measures necessary to bring about simultaneous international ballon-sondes ascensions. The Congress emphasised that private societies must share in these experiments.

The means of securing the safety of aeronauts in high ascents.

February 21.

In this sitting the Permanent International Aeronautical Congress concluded its examination of the resolutions of the Congress.

All resolutions relating to the title of "aeronaut-commander" and the rights and duties conferred by it are referred to the subcommittee of the "Aeronauts' Certificates."

The resolutions touching Custom House questions and the carriage by rail of aeronauts and their accessories are referred to the subcommittee of the Aeronautical Formulary or Guide Book.

A further sub-commission is charged to effectuate the resolution concerning the lowering of the price of gas supplied to aeronauts.

In conclusion, the Secretary-General read his summary of the Proceedings of the Congress of 1900 which will be published by the Administration of the Universal Exhibition.

March 21.

The Permanent International Aeronautical Commission in this sitting at the Institute of France under the Presidency of Professor Hergesell, approved a work read by Commander Renard on behalf of the Sub-Commission of Asphyxiation by Arsenated Hydrogen; this paper contained a memorandum by Captain Richard on the researches into this question in 1900 at the Chalais Establishment, and on preventive and curative measures, various extracts from the Registers of the Experimental Department of the Laboratories of the School of Mines, and a memorandum from Surgeon-Major Maljean on cases of arsenical jaundice observed in aeronauts anterior to 1900.

Naval-Lieutenant Tapissier, delegate of the Permanent Commission, at the approaching Congress of the International Maritime Association, read his report on the conditions in which the salvage of balloons at sea should be carried out, and on utilising aeronautical aids in maritime salvage.

Lastly, M. Hervé, also a delegate to this Congress, presented an historical appreciation of what has been done in this direction by kites and balloons since the last century, and also an account of all similar official and private experiments carried out at different epochs by the principal maritime nations.

International Ascents, Dec. 6, 1900.

Communicated by PATRICK Y. ALEXANDER.

PARIS (Trappes). I. Ballon-sonde, 2 hours before sunrise, launched. Landed near Freiburg (Baden).

II. Ballon-sonde, 8 a.m. launched, landed at Strassburg i. E.

III. Too windy for manned balloon.

STRASSBURG. I. Registrir balloon, launch not possible; too stormy.

II. Registrir balloon, System Teisserenc de Bort, with Teisserenc de Bort and Hergesell apparatus, launched 10.15 a.m., landed near Biberach, a. d. Riss. H., 6,000 metres. T.,—20° C. Speed of wind 40 metres per sec.

III. Manned balloon. Launch not possible; too stormy.

BERLIN. Aeronautical Observatorium. I. Registrir balloon, System Teisserenc de Bort and Tuess. Launched 5.7 a.m., landed 13 kilometres from Tegel. H., 2,900 metres. T.,—6° C.

Registrir balloon, 7.49 a.m. launched. H., 2,572. The balloons could not pierce through the clouds on account of snow ballast.

VIENNA. Ballon-sonde, passed away to the east; results not yet known.

ST. PETERSBURG results not yet to hand.

BATH, England. Ballon-sonde, launched 11.32 a.m., landed Baydon, between Swindon and Hungerford. H., 2,300 metres.

NOTES.

The Effects of Vertical Aerial Currents on Balloons.—In the Quarterly Journal of the Royal Meteorological Society for January last will be found a most interesting note on "Thunderstorm Observations during a Balloon Ascent," which is a translation of a note by Dr. R. Börnstein, published in the *Meteorologische Zeitschrift* for August, 1900:—

It appears that on June 8th, 1900, the balloon "Condor" ascended from Berlin, manned by three lieutenants of the Prussian Balloon Corps, who witnessed some remarkable electrical phenomena from their vicinity to a thunderstorm.

"The balloon was moving from south-west at about 11.30 a.m., at a height of 2,300 feet, just over Kaulsdorf (about 5 miles east of Berlin), and was enveloped in cloud, but occasionally the earth was visible through chinks in the cloud. The chief balloonist, Lieut. de la Roi, heard a sharp crackling sound at the ring of the car, like the noise of sparks from a large electrical machine, and when he looked up, he saw a spark 27 inches long, and about 0.5 in. in section, move up at an angle to 120° to the car ring. Lieut. Prin reported that while a flash was passing he saw the ring illuminated, and at the same time heard loud crackling. Lieut. Davis noticed 'an electrical spark like a lightning flash pass between balloon and car, with a loud hissing sound.' Thunder was heard before and after this phenomenon, and the supposition is that at this moment the thunderstorm was above the balloon."

These electrical phenomena were attended by one of those downward currents which can occur from various causes, and often prove fatal to the maintenance of a balloon in the atmosphere. In this case it appears that the pressure of the descending current was so great that the balloon descended with such rapidity, that the ballast provided, and which, under ordinary circumstances, would have checked the rate of descent, proved quite unavailing, and the balloon reached the ground with a discomforting bump. This was a striking example of the influence that vertical currents can exert on balloon voyages.

If an adverse horizontal current can conduct aerial travellers in an opposite direction to which they wish to go, an adverse vertical current can quickly terminate an aerial expedition, and the dependance on the caprices of both horizontal and vertical currents emphasises the necessity of nicer means of regulating the vertical motion of balloons. It is not surprising that aeronauts are looking forward with much interest to practical experiments with Monsieur Aimé's "Thermosphere," described in the last number of this journal, and which is an ingenious attempt to improve the vertical motion of balloons.

The Projected Balloon Trip across the Mediterranean.—By no means the least interesting of the aeronautical events promised for the coming season is Count de la Vaulx's projected balloon voyage across the Mediterranean. We are indebted to the correspondent of the *Daily Mail* for the following facts. The material of the balloon is to be French silk. The car will be made of rushes and will measure 2 metres 80 c.m. by 3 metres 20 c.m. Amongst the four

passengers, will be Lieut. Gentz, director of naval ballooning at Toulon. Every attempt will be made to keep up communication with the coast from the balloon, and in order to carrying out this intention, wireless telegraphy experiments and carrier pigeons will be taken up, also electric lights for signals. An attempt will be made to establish a line of communication between France and the African coast by utilizing the different aerial currents, and attention is promised to pure scientific research. It is proposed to start in June or July, at which period both the sea and air may reasonably be expected to be at their calmest. The car is to be provisioned for three weeks. It may, indeed, be hoped that this journey will not come to as abrupt conclusion as did that of Dr. Berson's great and provisioned balloon last September.*

Aeronautical Exhibits at the Royal Institution.—On the occasion of Dr. Bryan's discourse on the History and Progress of Aerial Locomotion at the Royal Institution, several objects of aeronautical interest were effectively displayed in the library, which largely contributed to the illustration of the professor's discourse. The exhibits included an historical series of lantern slides illustrative of aerial navigation, the property of the Honorary Secretary of the Aeronautical Society, the new emergency Bruce patent electric signalling balloon, which had just been received back from the Paris Exhibition, an admirable selection of box kites of every size, including the very pretty form of kite in imitation of a ship, lent by Messrs. Pain and Co., and some excellent specimens of photographs from balloons at great elevations by Mr. Percival Spencer.

Soaring Machines.—Dr. Bryan, in his recent interesting lecture at the Royal Institution, dwelt at some length on the subject of "Soaring Machines," and showed several illustrations of the machines of the late Mr. Pilcher and Mr. Octave Chanute. He considers that there is a future for the soaring machine in spite of the tragedies which have been connected with its manipulation, and advocates new enterprise in this direction.

Soaring machines have, however, been peculiarly disastrous to past experimenters, and if fresh attempts are to be made to gain in this way experience in the balancing movements of soaring birds, it becomes essential that the investigators should be protected in their experiments from the chances of those fatal falls which made both Lilienthal and Pilcher martyrs of science. Such protection might be afforded by means of large nets slung beneath the aerial spaces where the soaring machine is to hover. These safety appliances are afforded to acrobats in their so-called flying leaps and bounds from bar to bar and other gymnastic evolutions. Why, indeed, should it not form part of the preparations for the still more hazardous exercises of soaring?

The Return Journeys of the Navigable Balloon, "La France."—The recent experiments of Count Zeppelin have called for comparisons between the journeys made by his monster balloon, or, rather, combination of balloons, and those made by Captains Krebs and Renard in 1884. With their electrically-propelled aerostat "La France."

There appears, however, to be some confusion in the public mind as to the actual accomplishments of the latter air craft, and a tendency to underestimate its performances, which, in spite of the recent experiments of Count Zeppelin, is undoubtedly the best example of balloon navigation against the aerial current, though it did not succeed in doing more than overcoming a very light wind.

In the accounts that Captain Renard sent in to the French Academy in 1885 concerning the experiments, it is stated that out of seven experiments the balloon returned five times to the place whence it started. Those who may be interested in the details of this balloon will find a very complete description of its construction in Tissandier's "La Navigation Aérienne." It is a remarkable fact that on the 28th October, "La France" executed two ascents and two return journeys on the same day. The details and charts of these journeys will be found on page 313 of the above-mentioned work.

But one of the most satisfactory experiments was on September 22nd, 1885. On this occasion we are told that the wind blew from the north north-east from Paris at a velocity of from 3 to 3.50 metres per second. Starting from Meudon, the balloon was directed towards Paris at 4.25 p.m. It crossed the railway line at 4.55 p.m., reached the Seine at 5 o'clock. At 5.12 the balloon entered the enceinte by the bastion 65. Then the aeronauts decided to go home. The balloon was easily turned, and, aided by the aerial current, reached the exact spot whence it had started. The part of the journey against the wind took forty-seven minutes, the part with the wind eleven minutes. On

* See *Aeronautical Journal*, January, 1901, page 16.

the day following, a similar journey was performed successfully.

Kite-Flying Records.—Mr. Rotch writes concerning the article in the January issue on the Vincennes competitions, that the higher record there assigned to M. Teisserenc de Bort for kite flying was attained, not in the kite competitions at Vincennes as stated, but in M. Teisserenc de Bort's observatory at Trappes. Mr. Rotch mentions he was a juror in the Vincennes Kite Competitions. The French authority, however, for the statement in our issue couples this ascent with the record of the competitions.

Obituary.

PROFESSOR G. F. FITZGERALD.

We regret to announce the death of George Francis Fitzgerald, Erasmus Smith Professor of Natural and Experimental Philosophy in the University of Dublin, and who was an esteemed member of the Council of the Aeronautical Society of Great Britain. He was born in Dublin in 1851, and educated at the same college in which he afterwards held an important post. He was a Fellow of the Royal Society. In 1888 he was President of Section A British Association. To him was entrusted in 1896, the delivery of the Helmholtz Memorial Lecture before the Chemical Society, and in 1899 he was the recipient of a royal medal from the Royal Society "for his brilliant contributions to Physics," the most conspicuous of which were his researches in radiation and electrical theory. Professor Fitzgerald is a great loss to the Aeronautical Society, in whose objects and work he took the deepest interest. Since the foundation of the New Aeronautical Journal, he has contributed two papers to its pages—one on "Experimental Soaring," October, 1898, and another on "Sailing Birds," July, 1900.

Foreign Aeronautical Periodicals.

On this list a selection of some of the most notable articles is given.

L'AERONAUTE (Paris).

October, 1900.—Congrès d'Aéronautique (2me article) Travaux des Sections.—L'Incident Fonvielle.—Etude Comparative sur la Déviation des Ballons.

November.—Les Concours de Ballons de l'Exposition de 1900: M. Eugène Godard.—Congrès International d'Aéronautique de 1900 (2e section).—L'Aviation Militaire: M. Ader.

December.—Les Léonides en 1900: Mlle. Klumpke.—Les Aéronautes du Siège de Paris: M. E. Aimé.—La Direction des Ballons: M. E. Aimé.

January, 1901.—Concours Internationaux d'Exercices Physiques et des Sports.—La Logique de la Navigation Aérienne: Le Prince Dimitry-Tzerteleff.

February.—L'Avenir de la Navigation Aérienne (2e article).—Le Vol à Voile et l'Aviation: M. J. Pillet.

L'AEROPHILE (Paris).

January, 1901.—Portraits d'Aéronautes Contemporains: M. Henry Deutsch de la Meuthe (E. Aimé); La Défense d'Andrée (W. de Fonvielle); Le Ballon Dirigeable du Comte Zeppelin (E. S.).

February.—Portraits d'Aéronautes Contemporains: M. Georges Juchmès (Georges Besançon); Le Ballon du Comte Zeppelin (J. Subzberger).

ILLUSTRIRTE AERONAUTISCHE MITHEILUNGEN (Strassburg).

January, 1901.—Ueber die Bedeutung Luftelektrischer Messungen in Freiballon: Dr. Hermann Ebert.—Bericht uber den Stand der Versuche Mit Einem Drachenflieger: W. Kress.

Notable Articles.

1901.

Jan. 2. *Daily Express.*—"4,500 feet above Earth."
5. *Daily Mail.*—"A South Pole Balloon."
9. *Times.*—"Count Von Zeppelin's Air-Ship."
17. *Standard.*—"Ballooning on the Baltic."
18. *Daily Chronicle.*—"Aerial Currents and Navigable Balloons."
24. *Church Family Newspaper.*—"The Progress of Aeronautics." A Chat with Mr. Percival Spencer.

Feb. 8. *Daily News.*—"The Art of Flight."
9. *Morning Leader.*—"Scientific Ballooning."

Feb. 28. *Daily News.*—"Aerial Navigation."
Mar. 2. *Morning Post.*—"French Balloon Enterprise."
3. *New Penny Magazine.*—"Flying by Kite."
15. *Morning Leader.*—"The New High Flyer."
28. *Morning Post.*—"New Air Ship."

Applications for Patents.

(*From December 28th, 1900, to March 22nd, 1901.*)

List of Applications for Aeronautical Patents during December (1900), January, February, and March, 1901. Compiled by BROMHEAD & Co., 33, Cannon Street, London, E.C.

23,108. December 28, 1900. ERNST CUYER, 72, Cannon Street, London, E.C. **Improvements in Flying Machines.**

23,845. December 31, 1900. ANDREW HERBERT BYRAN, and ALEXANDER REID BAIRD, 111, Hatton Garden, London, E.C. **An Aerial Machine and Improvement in Apparatus in Connection with suchlike Machines.**

346. January 9, 1901. ARTHUR HENRY PHILIP BLUNT, 104, Albert Street, Regent's Park, London. **An Improved Flying Machine.**

883. January 23, 1901. PATRICK JOSEPH FLYNN, 23, Coleman Street, London, E.C. **Improvements in Air Ships.**

1,066. January 23, 1901. GEORGE VICHOLL, 45, Southampton Buildings, Chancery Lane, London. **Improvements Relating to Flying Machines.**

1,489. January 30, 1901. JOSEPH HENRY DILLON-GREGG, 55, Chancery Lane, London. **Machine for Aerial Navigation.**

1,899. February 6, 1901. HEINRICH HILDEBRAND, 15, Took's Court, Cursitor Street, Chancery Lane, London. **Improvements in Flying Machines or Aeromobiles.**

2,166. February 6, 1901. STANISLAUS VICTOR SALONI, F2, Cannon Street, London. **Improvements in Steerable Air Balloons.**

2,658. February 13, 1901. ANTON WECZERA and LEWIS WELLS BROADWELL, Lydian House, Westbury Gardens, Loats Road, Clapham Park, London. **Improvements in Flying Machines.**

2,749. February 13, 1901. WILLIAM BILES, 130, Portway, West Ham Park, West Ham, Essex. **Propelling Vessels or Flying Machines.**

3,691. February 27, 1901. MAURICE LEGER, 18, Buckingham Street, Strand, London. **Improvements in Flying Apparatus.**

4,089. March 6, 1901. AUGUSTE EUGENE GAUDRON, 42, Chancery Lane, London. **Improvements in Navigable Balloons.**